

Marsh Restoration at San Jacinto Battleground State Historical Park Harris County, Texas

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Introduction

The San Jacinto marsh is a three-hundred acre tidal wetland complex preserved within the San Jacinto Battleground State Historical Park in Harris County, Texas. The marsh is important for its cultural, as well as biological values. In April, 1836, the marsh played an important role in deciding the fate of the Texas revolution when hundreds of Mexican soldiers, fleeing the rout of their camp by Texian volunteers, became bogged down in the mud and were unable to escape or organize a defense.

Unfortunately, much of the San Jacinto marsh has deteriorated or disappeared over the years due primarily to subsidence and erosion. Planning for restoration and future management of this site to preserve both its biological and cultural values has been underway since 1993. Because the Department does not have funds to pay for extensive restoration projects, viable partnerships will be the key to a successful project.

Objectives

The marsh at San Jacinto was formed hundreds of years ago by the northward meandering of the San Jacinto River. The marsh is a shallow basin contained historically by a natural riverine levee which routes all drainage through Santa Annas Bayou. Impacts to the marsh began in the early 19th century when cypress timber was harvested along the river. By the turn of the century, these same banks were being impacted by deposition of dredge material from maintenance of the Houston Ship Channel (HSC). In the early 1950's, most of the marsh was surrounded by levees to permit additional deposition of dredge spoil, which continued for another 20 years. The marsh was acquired by the state in the 1970's to help insulate the historically important San Jacinto battleground from encroaching development.

Accelerating subsidence due to ground water withdrawal converted much of the marsh to shallow open water during the 1970's and 80's, despite the addition of some two meters of dredge fill over the years. The conversion from historic emergent marsh to open water compromised not just the biological diversity and productivity of the park, but also the ability to interpret the battleground and the battle for visitors.

In 1993, increasing interest by TPWD in the stewardship of natural resources on state park lands led to the decision to address deterioration of the San Jacinto marsh. An informal conference of local wetlands experts and agency personnel was called at the park September 1, 1993, to recommend marsh management actions and discuss the feasibility of restoration. From that meeting evolved recommendations for a multi-phased project to convert cells of shallow open water back to emergent *Spartina alterniflora* marsh using dredged sediments from maintenance of the HSC. Further review of the project has resulted in additional restoration phases, including a project to reclaim subsided lands by construction of an offshore berm in the San Jacinto River, and cooperative management of the park with other local restoration sites.

TPWD and the San Jacinto Museum of History Association are now engaged in a joint project to produce a new master plan for the entire 1000-acre park which will address all aspects of park development and operation. Consistent with the mission and goals of the master plan, objectives for restoration of the marsh are defined in terms of replicating the historic setting and environment of the battleground, and returning the historic mosaic of habitats, species and functions to the park's wetlands. This philosophy has been extended to cover restoration of other park habitats, including prairie and bottomland hardwood forest as well.

Methodology

First, a draft marsh restoration plan was prepared and circulated to biologists at TPWD, U.S. Fish and Wildlife Service (USFWS) and others for comment. Contact was made with the U.S. Army Corps of Engineers (COE) and the Texas Natural Resource Conservation Commission (TNRCC) regarding relevant regulatory authority, and a Section 404 permit application was prepared and submitted. Contact with COE determined that a maintenance dredging cycle was planned for the HSC in summer, 1996, and that the COE would be willing to have dredged material hydraulically placed directly into the San Jacinto marsh by the selected dredging contractor. If the cost of placing the material at San Jacinto was found to exceed the cost of placement at a traditionally dredge disposal area, TPWD would still have the option of having the sediments placed in the marsh by paying the difference.

Fortunately, the use of dredged sediments to restore marsh at San Jacinto constitutes a beneficial use. Beneficial uses are an integral part of the HSC Deepening and Widening Project, and the COE is open to identifying and supporting beneficial uses for both their biological and their economic value. In the case of San Jacinto, the added public relations and interpretive opportunities resulting from a local/state/federal partnership are also attractive to all parties. For this reason, the COE was able to provide planning services which TPWD could not have otherwise afforded, including site survey work, discharge pipe schedules and recommendations for water control structures.

For the purpose of marsh creation, the San Jacinto marsh divided conveniently into two cells by existing dredge containment levees from the 1950's. The Phase I (upstream) cell is roughly one hundred acres, and the Phase II (downstream) cell is approximately one hundred and ten acres. Early

in the process, the decision was made to restore the Phase I cell first, and to restore the Phase II cell after the first cell had vegetated sufficiently to provide forage and cover for birds that might be displaced by restoration work in the second cell. Since that time, restoration at Brownwood Subdivision, directly across the river from the park, has alleviated concerns for the displacement of birds, and the decision has been made to ready both cells for acceptance of dredge material.

A number of actions are involved in marsh restoration, including Section 404 permitting for wetland impacts, Section 401 permitting for water quality certification, engineering and design work, site preparation, project funding and project coordination. The original plan called for importing sediments from dredging operations between Carpenters and Greens Bayous, in the HSC just upstream from the park. This dredging operation would have supplied sediment for marsh restoration in the summer of 1996. Chemical analysis by the COE and TNRCC suggested that there was sufficient contamination present to warrant further evaluation. Additionally, concerns arising from the past history of the HSC, and the potential for biologically harmful effects from contaminants, led the contaminant review team to biologically test the sediment for toxicity. This biological toxicity testing demonstrated that the sediments were potentially harmful to mollusks and crustaceans, and the decision was made to wait for sediments from farther downstream, scheduled for dredging in fall, 1997. These sediments are expected to be less toxic and have a greater proportion of sand, important considerations for this application.

Fortunately, the topography and hydrology of the marsh basin at San Jacinto makes restoration relatively straightforward. Nonetheless, preliminary work is required, and finding ways to pay for site preparations, sediment testing and other related expenses is a significant aspect of the management of the project. Work to the Phase I cell included repair of old containment levees, and fabrication and installation of three, four-foot flashboard risers for water control. Preparation of the Phase II cell is expected to commence in the spring of 1997, and will include construction of low containment berms and additional water control structures. Partnerships, some dating back to the first marsh meeting in 1993, have proven to be the key to pooling the resources needed to make this restoration a reality.

In the summer of 1995, USFWS approved an application for federal aid Administrative Funds in the amount of \$38,000 to initiate site preparations for marsh restoration at San Jacinto. These funds paid for levee repair work and construction of flash board risers. Installation of the risers was paid for with funds received in association with mitigation for a small wetland impact at Bayport. Much of the design work for the marsh, including survey work and recommendations for riser construction, has been provided by the COE. TPWD provided funding for a contract with the Houston office of ENTRIX to verify work specifications and prepare recommendations for managing the restored marsh.

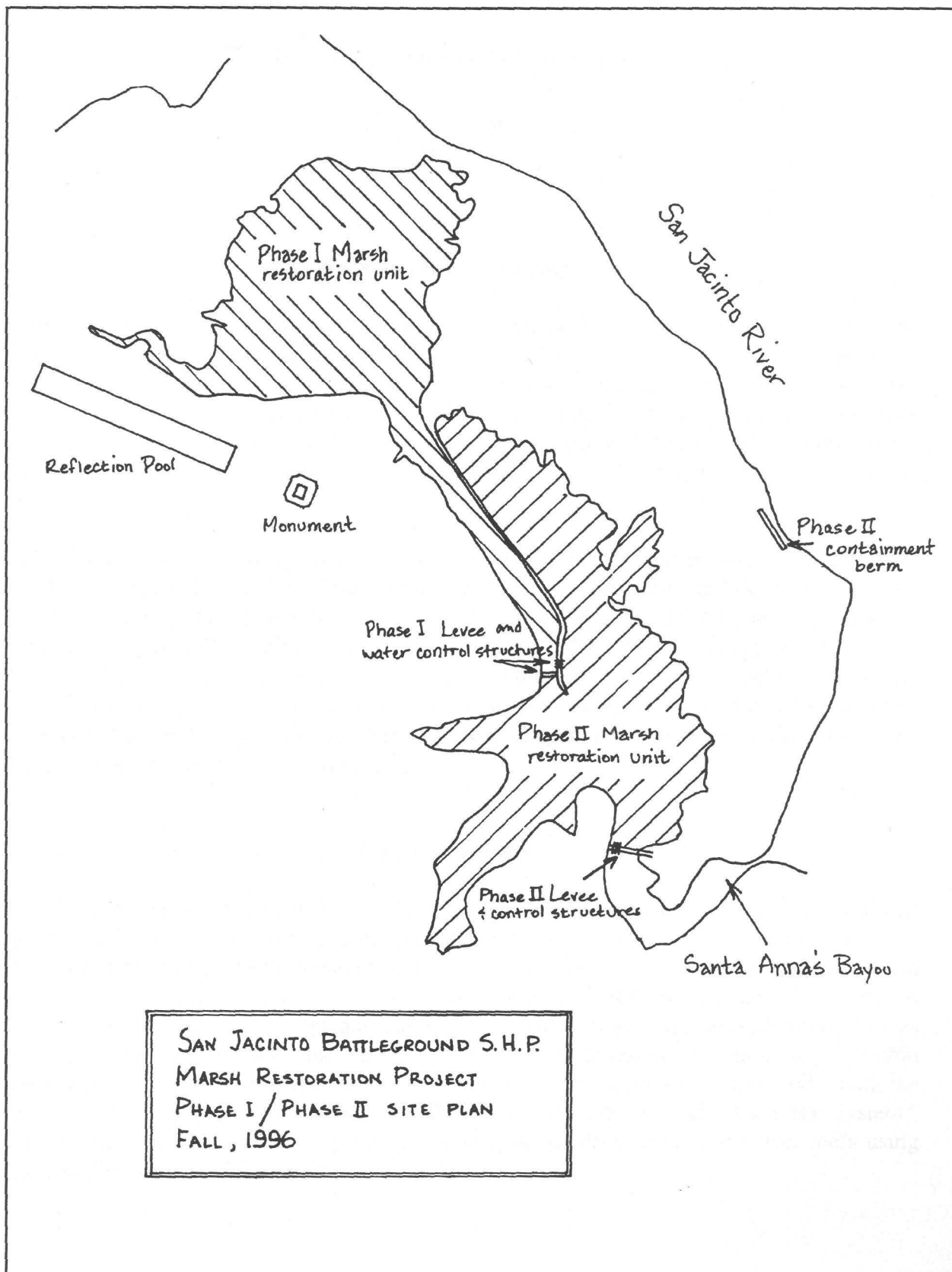
Funds for testing sediments from the next round of maintenance dredging, and site preparations in the Phase II marsh cell have been allocated by trustees of the Texas Natural Resource Damage Assessment committee (NRDA). The funds being administered by these trustees resulted from the Apex accident and spill, which occurred in Galveston Bay in 1990. The list of partners is rounded

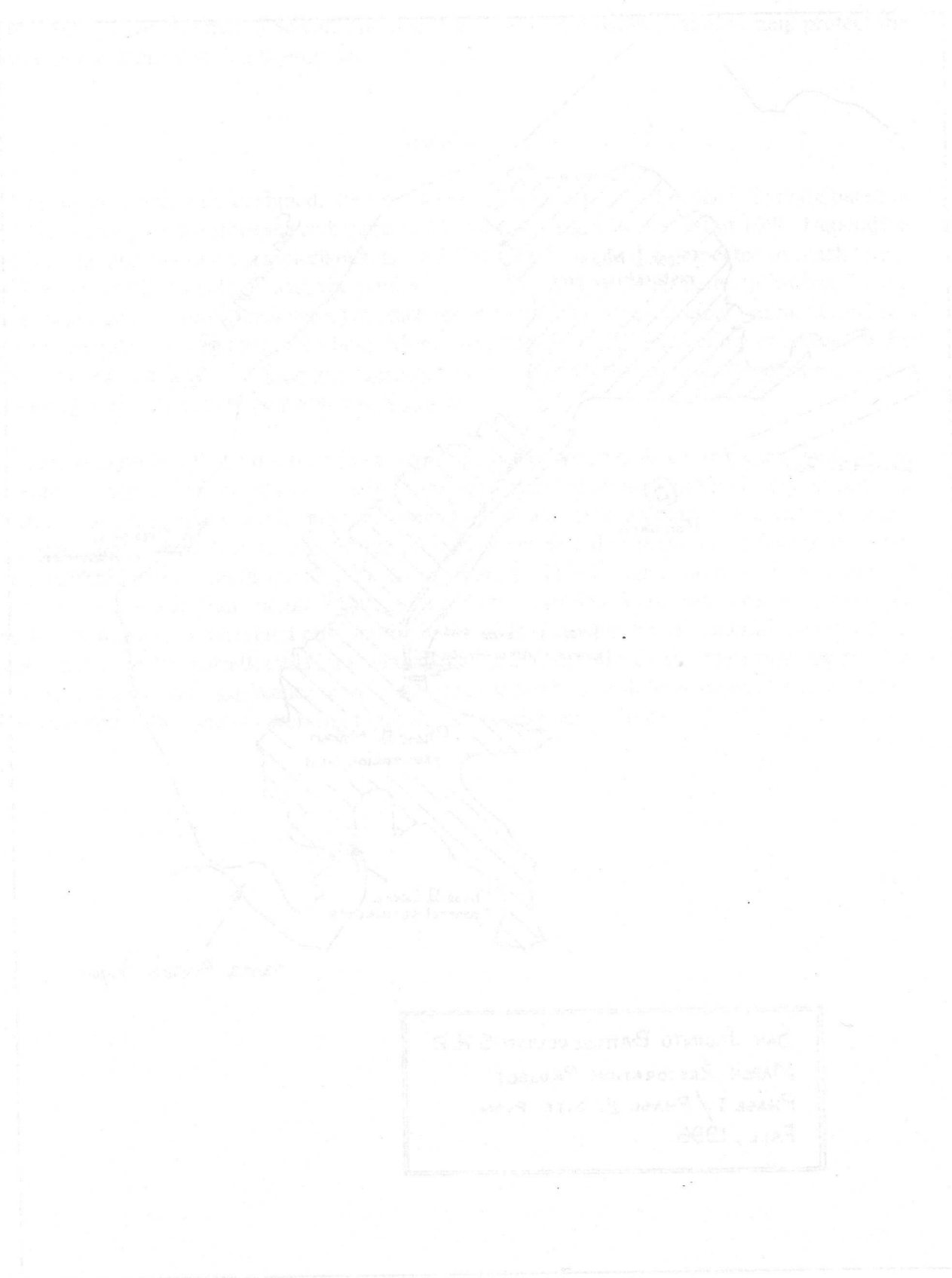
out by Texaco, which granted San Jacinto nearly \$20,000 for erosion control to help protect the restored marsh from loss due to erosion.

Results

As the project is currently designed, the first loading of sediment into the marsh is anticipated in late 1997. Testing of the proposed sediments is scheduled to begin by the end of 1996. Depending upon bulking and loading characteristics, around forty acres of marsh is expected to reach target elevation in the first loading, with the remaining one-hundred and fifty acres (allowing for the natural occurrence of some open water) to reach target elevation with the second sediment loading, likely to take place two-to-four years later. Monitoring schedules call for seeding or sprigging the entire restored marsh area in *Spartina alterniflora* in the months that follow, though areas which exceed target elevation may be planted in *S. patens*.

The ultimate benefits of marsh restoration at San Jacinto will not be realized for several more years. The restored marsh is expected to maintain salinity and nutrient regimes more closely resembling its historic condition, and foster the return of fresh to intermediate communities. A number of plants and animals not seen at San Jacinto for many years are expected to reappear, including the river otter, mink and American alligator. Just as important to TPWD, the hundreds of thousands of visitors who come to San Jacinto Battleground State Historical Park each year will have the opportunity to better understand not just the battle of San Jacinto, but the natural history of the Texas Gulf Coast. Boardwalk trails into the marsh are planned, and will provide a rare opportunity to share the beauty and significance of our vanishing wetlands, and show what can be achieved by the private and public sectors working together to preserve our heritage.





Fall, 1994
Phase I / Phase II Site Plan
JAMES SAN JOSE STATE
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